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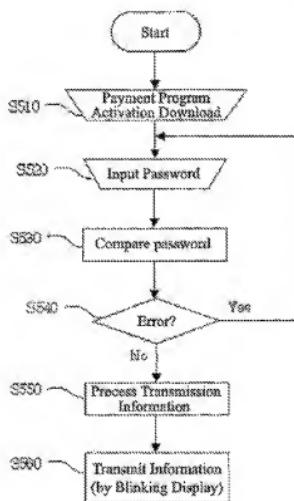
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(54) Title: AN ELECTRONIC BILLING SYSTEM USING BLINKING SIGNAL OF DISPLAY PANEL, OF MOBILE COMMUNICATION TERMINAL AND A METHOD THEREOF



(57) Abstract: The present invention relates to an electronic payment system and method using the blinking signal of the display unit of a mobile communication terminal, which transmits authentication information using the blinking signal, thus conveniently processing electronic payment. The present invention provides an electronic payment system and method, which transmits authentication information using the blinking signal of the display unit of a mobile communication terminal and allows a simple optical reader to read and process the authentication information, thus further expanding the range of electronic payment using mobile communication terminals through the reduction of infrastructure costs for readers, and which utilizes means for applying the basic function of typical mobile communication terminals, thus allowing persons operating a payment system to reduce costs required to construct the system and allowing users utilizing the payment system to reduce costs and increase convenience.

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AN ELECTRONIC BILLING SYSTEM USING BLINKING SIGNAL OF DISPLAY  
PANEL OF MOBILE COMMUNICATION TERMINAL AND A METHOD THEREOF

Technical Field

The present invention relates, in general, to an electronic payment system and method using mobile communication terminals (for example, mobile phones, cellular phones, personal digital assistants, personal communication systems, code division multiplex access-2000, international mobile telecommunication-2000, etc.) and, more particularly, to an electronic payment system and method using the blinking signal of the display unit of a mobile communication terminal, which transmits authentication information using the blinking signal, thus conveniently processing electronic payment.

Background Art

Recently, with the rapid development of information and communication technologies, various payment methods using mobile communication devices have been developed. Among the payment methods, an electronic payment method using a mobile phone is disclosed in Korean Laid-open Publication No. 2003-0012910, which is based on the fact that a conventional method of approving credit card transactions is problematic in that affiliate shops must be equipped with credit authorization terminals and access a telephone network in a wired manner to process payment by credit card, so that the affiliate shops must purchase expensive credit authorization terminals, and additionally incur wired equipment installation costs. For a means for solving the conventional

problem, the above patent is characterized in that a card reader is installed in a mobile phone, or an infrared port is utilized. However, the above method is limited in that not only the determination whether typical credit card payment is approved is confirmed through a mobile phone in a wireless manner, but also a device for emitting infrared rays or a communication port is separately required in the case where the card reader or the infrared port is installed in the mobile phone.

Further, Korean Laid-open Publication No. 2001-007921 and 10 Korean Laid-open Publication No. 2003-0028944 disclose a method of paying money by inputting a barcode to a mobile phone and reading the barcode on the mobile phone using a barcode reader.

However, the above prior art is problematic in that an expensive and separate device, such as a barcode reader, is 15 required, thus increasing infrastructure costs, and causing security problems, such as easy reproduction or illegal use occurring by malicious persons.

As another example, a mobile phone payment method using Radio Frequency (RF) signals has recently been proposed. 20 However, this method is disadvantageous in that an additional device capable of recognizing RF signals must be provided, or a special mobile communication terminal produced to accommodate RF signals must be used.

As described above, the conventional electronic payment 25 methods are disadvantageous in that equipment required for payment, that is, an RF chip or infrared module in a mobile communication terminal, or a reader for recognizing a signal transmitted from the barcode, are expensive, thus increasing costs required to construct a payment system. Further, in the case of methods using RF signals or infrared rays, infrastructure

costs required for the electronic payment methods considerably increase in such a way that users desiring to use the above electronic payment methods must purchase special mobile communication terminals, thus greatly decreasing the utility of  
5 the electronic payment methods.

Disclosure of the Invention

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide an electronic payment system and method, which transmits authentication information using the blinking signal of the display unit of a mobile communication terminal (hereinafter, the "blinking signal of the display unit" refers to a signal including the blinking of the display unit, the blinking of a backlight and periodic variations in color of the display unit), and allows a simple optical reader to read and process the authentication information, thus further expanding the range of electronic payment using mobile communication terminals through the reduction of market infrastructure costs for readers, and which utilizes means for applying the basic function of typical mobile communication terminals, thus allowing persons operating a payment system to reduce costs required to construct the system, and allowing users utilizing the payment system to reduce costs and increase convenience in such a way that the present invention can remove the inconvenience of requiring the users to purchase new special mobile communication terminals equipped with an RF function or infrared communication function, or to additionally install RF chips or infrared modules in their existing mobile  
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communication terminals.

Another object of the present invention is to provide an electronic payment system and method, which provides a primary security function of preventing a third party from paying using the mobile communication terminal of a user due to the loss of the mobile communication terminal, by allowing the user to input a password previously registered with both the server of a service provider and the mobile communication terminal when the user desires to perform electronic payment using the mobile communication terminal, that is, when a payment program is activated, which provides a secondary security function of prohibiting hacking through an encryption system that is automatically updated even though a third party imitates or illegally use the pattern of the blinking signal of a specific mobile communication terminal, by allocating an encryption method of automatically updating the pattern of the blinking signal at specific periods when information is transmitted using the blinking signal of the display unit of the mobile communication terminal, and which additionally provides a tertiary security function of allowing a reader and the server to use additionally encrypted codes therebetween in the case where authentication information passes through a public network, such as wired/wireless Internet, thus guaranteeing the safety and reliability of the electronic payment.

25 Brief Description of the Drawings

FIGS. 1 and 2 are views showing the construction of an electronic payment system using the blinking signal of the display unit of a mobile communication terminal according to the

present invention;

FIG. 3 is a detailed block diagram showing the mobile communication terminal and an optical reader according to the present invention;

5 FIG. 4 is a conceptual view showing the transmission of information using the blinking of the display unit according to the present invention;

FIG. 5 is a flowchart showing a user registration process according to the present invention;

10 FIG. 6 is a flowchart showing a payment program download process according to the present invention;

FIG. 7 is a flowchart showing a password change process according to the present invention;

15 FIG. 8 is a flowchart showing a payment limit change process according to the present invention;

FIG. 9 is a flowchart showing an authentication information transmission process according to the present invention;

20 FIG. 10 is a flowchart showing the processing of information by the optical reader according to the present invention; and

FIG. 11 is a flowchart showing a payment approval process according to the present invention.

\*Description of reference characters of important parts\*

25 100: mobile communication terminal

110: control unit of mobile communication terminal

120: communication unit of mobile communication terminal

130: memory unit of mobile communication terminal

140: display unit 200: optical reader

30 210: light receiving sensor 220: control unit of optical

reader

- 230: indication unit of optical reader
- 240: communication unit of optical reader
- 300: public or private network
- 5 400: payment approval server
- 500: central control server      600: personal computer
- 700: internal network

Best Mode for Carrying Out the Invention

Hereinafter, embodiments of the present invention based on  
10 the above technical spirit will be described in detail with  
reference to the attached drawings.

FIG. 1 is a view showing the construction of an electronic  
payment system using the blinking signal of the display unit of a  
mobile communication terminal according to an embodiment of the  
15 present invention.

In this case, reference numeral 100 denotes a mobile  
communication terminal that performs a typical wireless  
communication function, transmits authentication information by  
blinking the display unit using a payment program downloaded from  
20 a central control server 500, and receives a message from the  
central control server 500 if necessary.

Reference numeral 200 denotes an optical reader that  
receives the authentication information from the mobile  
communication terminal 110 by sensing the variations in an  
optical signal according to the blinking of the display unit of  
the mobile communication terminal 100, decrypts encrypted  
25 authentication information, and transmits the decrypted  
information to a payment approval server 400 through a public or

private network 300.

The optical reader may be connected to external devices, such as game machines or vending machines, which are objects to be controlled by the optical reader. Further, a single optical reader can be installed in one shop, or a plurality of optical readers can be installed together and connected to each other through a communication network in one shop, such as a game room.

Reference numeral 300 denotes a public network, such as wired/wireless Internet and Integrated Services Digital Network (ISDN), or a private network, such as a Virtual Private Network (VPN) Service Provider (VSP), and may denote a public or private network, in which the public and private networks may be connected to each other, according to circumstances.

Reference numeral 400 denotes the payment approval server that controls the entire operation related to electronic payment, such as by determining whether to approve payment by a user on the basis of the information transmitted from the optical reader 200 and by transmitting payment details to the central control server. In this case, the payment approval server can be installed anywhere, such as a financial institution, a general company, a personal service provider or a communication company. The name of the payment approval server can change, as in the case of a service provider server or payment service provider server having the same meaning.

Reference numeral 500 denotes the central control server that is installed in a mobile communication company to function to intermediate communication required for performing the present invention, receive payment details from the payment approval server, include a payment amount in telephone charges, and bill the user for the payment amount.

FIG. 2 is a view showing an example in which a personal computer is disposed between an optical reader and a public or private network in the system of FIG. 1.

In this case, reference numeral 600 denotes a personal computer or an interface device for a communication network interface (hereinafter referred to as a "personal computer") that receives the authentication information from the optical reader 200 and transmits the authentication information to the payment approval server 400, or returns the information received from the payment approval server 400 to the optical reader 200. If necessary, the personal computer 600 primarily approves payment by receiving authentication information from the optical reader, and formally ascertains whether to approve the payment by later transmitting the authentication information to the payment approval server 400. Thereafter, if the approval result provided from the payment approval server 400 is "approved", the personal computer bills an amount, while if the approval result is "disapproved", the personal computer cancels the primary payment.

Reference numeral 700 denotes an internal network that connects the optical reader 200 to the personal computer 600, and represents a private network using Institute of Electrical and Electronic Engineers (IEEE)-485, a wireless modem, a power modem, etc.

Hereinafter, technology of transmitting user authentication information using the blinking of the display unit of the mobile communication terminal is described in detail.

FIG. 3 is a detailed block diagram showing the mobile communication terminal and the optical reader according to the present invention. As described above, reference numeral 100 denotes the mobile communication terminal for transmitting

authentication information, and reference numeral 200 denotes the optical reader for receiving the authentication information by recognizing the variations in an optical signal according to the blinking of the display unit of the mobile communication terminal.

Further, the mobile communication terminal 100 includes a control unit 110 for processing authentication information required for payment if an external command is received, while performing the basic function of the terminal, a communication unit 120 having a wired/wireless communication function to perform the unique communication function of the terminal, a memory unit 130 for storing therein firmware that controls the unique function of the terminal and storing a payment program and information required for authentication, and the display unit 140 for transmitting information by blinking in response to a command provided from the control unit at the time of electronic payment, while displaying character or image information.

As described above, the present invention transmits authentication information using the blinking of the display unit 140 of the mobile communication terminal. This function can be simply performed using a payment program. That is, in the prior art, RF signals, infrared signals or barcodes were used to transmit authentication information, while, in the present invention, the authentication information is displayed by shortening or lengthening the blinking period of the display unit, the period of color variations or the blinking period of a backlight.

In other words, as shown in FIG. 4, when information to be transmitted is represented by binary numbers, the present invention shortens the blinking period of the display unit

(portions "A") when the binary number "0" is required to be indicated, while it lengthens the blinking period of the display unit (portions "B") when "1" is required to be indicated, thus transmitting information. It is apparent that indication opposite to the above is possible, if necessary.

In the meantime, the optical reader 200 of the present invention includes a light receiving sensor 210 for sensing the variations in an optical signal according to the blinking of the display unit of the mobile communication terminal 100, a control unit 220 for decrypting encrypted information received by the light receiving sensor, correcting errors and additionally encrypting and outputting error-corrected results, an indication unit 230 for generating an alarm when errors are determined to be irrecoverable as a result of error correction by the control unit, and a communication unit 240 for transmitting results output from the control unit to the payment approval server 400 through the personal computer connected to the outside of the optical reader or the public or private network.

Hereinafter, a method of operating the electronic payment system according to the present invention is described.

FIG. 5 is a flowchart showing a user registering step as a first step for utilizing an electronic payment method according to the present invention. User registration can be performed not only by off-line registration using documents and on-line registration through the Internet, but also by on-line registration allowing a user to access a service provider server (in this case, payment approval server) through the wireless Internet using the mobile communication terminal 100.

When desiring registration, the user is required to input a resident registration number, a phone number, and a password

required for authentication at the time of later utilizing a payment program so as to verify whether the user of the mobile communication terminal is the correct user at step S110. Further, when input of the numbers has been completed, the  
5 information about the input numbers is transmitted to the payment approval server 400 through the central control server 500 at step S120. Then, the payment approval server 400 performs a verifying operation for the authentication of the user on the basis of the received information at step S130. If the user is  
10 successfully authenticated as a result of the verification at step S140, the payment approval server stores the authentication information, transmits an authentication completion message to the mobile communication terminal of the user, and allows the user to use payment related menus at step S150. However, if the  
15 authentication is not successfully completed, the payment approval server transmits an authentication error message to the communication terminal of the user at step S160, and requests the user to input a resident registration number and a password again at step S120. If authentication fails a certain number of times  
20 in spite of repeated attempts to input the information, the payment approval server verifies that authentication is not permitted, and prohibits the user from utilizing payment related menus at step S160.

In the meantime, only the on-line registration using the  
25 mobile communication terminal is described above, but on-line registration using the Internet can be performed through a process similar to the above-described process. The user personally draws up and submits documents, thus enabling the registering step to be performed off-line.

30 After the user authentication has been successfully

completed through the registering step, the user must download a payment program from the central control server 500 so as to perform electronic payment. There is a method of installing the payment program on the mobile communication terminal in advance  
5 in a stage of producing the mobile communication terminal, but a method of downloading the payment program on-line is described here with reference to FIG. 6.

In order for the user to download the payment program on-line, the user executes a user authentication process after  
10 accessing the payment approval server using the mobile communication terminal 100 over the wireless Internet, and selects "payment program download" from the menu screen on the mobile communication terminal 100 when the use of the service is activated at step S210. Then, the payment approval server  
15 transmits the payment program stored therein to the mobile communication terminal 100 at step S230. After the download has been completed, the mobile communication terminal 100 terminates the payment program or returns to the menu screen.

The above program download process can be arbitrarily  
20 executed by the user when the user initially registers or when the program is updated. Further, in the case of a download method, there is a method of allowing the user to connect his or her mobile communication terminal to a personal computer, operated by an electronic payment service provider, through the  
25 use of a communication interface, such as Universal Serial Bus (USB), Recommended Standard (RS)-232 or IEEE-485, and to directly download the payment program from the PC, other than the above-described method. At this time, the personal computer stores entire information required for user authentication and the  
30 payment program for mobile communication terminals.

The user can freely change a password required for user authentication or payment approval at any time if necessary. FIG. 7 is a flowchart showing a process of changing a password by the user. When desiring to change a password, the user executes  
5 a user authentication process after accessing the payment approval server using the mobile communication terminal 100 over the wireless Internet, as described in the above payment program download process, and selects "password change" from the menu screen on the mobile communication terminal 100 if the use of the  
10 service is activated at step S310. Then, the mobile communication terminal 100 requests the user to input a new password at step S320, and input the password again so as to confirm the password at step S330. After the input of the password has been completed, the mobile communication terminal  
15 100 requests the payment approval server 400 to change the password by transmitting the new password to the payment approval server 400 at step S340. The server changes the password and then notifies change confirmation at step S350. Further, the mobile communication terminal 100, having received the change confirmation notification, updates a previous password stored in  
20 the memory 130 thereof at step S360.

FIG. 8 illustrates a flowchart showing a process of changing a payment limit by the user. As in the case of the password change described above, the user can freely set and change a payment limit, which can be paid by the user, at any time. When desiring to change the payment limit, the user executes a user authentication process after accessing the payment approval server using the mobile communication terminal 100 over the wireless Internet, and selects "payment limit  
25 change" from the menu screen on the mobile communication terminal  
30

100 if the use of the service is activated at step S410. Then, the mobile communication terminal 100 requests the user to input a new limit amount at step S420, and to input the new limit amount again so as to confirm the limit amount at step S430.

5 After the input of the limit amount has been completed, the mobile communication terminal 100 requests the payment approval server 400 to change the payment limit by transmitting the new payment limit to the payment approval server 400 at step S440. The payment approval server determines whether the change of the payment limit is possible with reference to the credit status of the user, etc. and then notifies the mobile communication terminal 100 of change approval at step S450. Thereafter, the user can perform electronic payment using the mobile communication terminal 100 up to the new limit amount from that time.

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In the meantime, the process of changing the password and the payment limit on-line using the mobile communication terminal is described above, but the above process can be executed by an off-line method using documents, an on-line method through the Internet, etc. as in the case of user registration.

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Hereinafter, an electronic payment method using the electronic payment system according to the present invention is described.

FIG. 9 is a flowchart showing a process of transmitting authentication information so as to allow a user to obtain payment approval using a mobile communication terminal. As shown in FIG. 9, when the user desires to pay using the mobile communication terminal, for example, so as to purchase a commodity or use an externally connected device, such as a game machine or vending machine, the user commands the mobile

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communication terminal to activate the payment program installed therein at step S510. This payment program activation command can be issued by selecting a menu program included in the communication terminal or by utilizing a keypad or shortcut key from the outside of the communication terminal.

If the payment program activation command is input, the mobile communication terminal 100 requests the user to input a password. Then, the user inputs the password using the keypad of the communication terminal, or a touch screen, a touch pen, etc. at step S520. This is required to prevent a third party from utilizing the payment program when the user loses the mobile communication terminal.

When the password stored in the memory 130 is identical to the password input by the user at step S540, the control unit 110 of the mobile communication terminal processes authentication information to be transmitted to the payment approval server 400 through the optical reader 200 at step S550. The processing of the authentication information can be executed through various methods according to the designation of the payment program. However, in the embodiment of the present invention, there is used a method of combining a telephone number or the unique number of the terminal (hereinafter referred to as a "terminal number"), a password, and an encryption pattern code together. In this case, the terminal number can be composed of a country code, a business registration number, a terminal number, etc. These numbers can use the information, which the firmware of the mobile communication terminal includes, without change, or be recorded in the memory of the terminal when the payment program is installed.

In the meantime, the present invention defines various

types of encryption patterns in advance so as to prevent accidents from occurring due to the duplication and illegal use of transmitted information or the blinking pattern of the display unit, and vary information processing formats depending on the pattern types. The encryption patterns are defined using current time, a password, a terminal number, etc. Further, the information processing step includes an operation of binarizing the processed information so as to easily transmit the processed information by the blinking of the display unit of the mobile communication terminal.

If the processing of the transmission information has been completed, the control unit 110 performs the blinking of the display unit depending on the binarized transmission information, thus transmitting the information at step S560. For the blinking of the display unit, there is used a method of shortening (or lengthening) the blinking period when data indicates "0", and lengthening (or shortening) the blinking period when data indicates "1", as described above. Preferably, the transmission information is continuously and repeatedly transmitted several times to prevent errors.

In this case, for example, when a fixed amount is paid each time, and an affiliate shop is specified, information about a payment amount or affiliate shop code can be stored in advance in the payment approval server. When a payment amount is variable, or there exists a plurality of affiliate shops, a payment amount and affiliate shop codes can be input through a predetermined terminal before payment. The information about the payment amount is transmitted to the payment approval server through the reader or the personal computer.

FIG. 10 is a flowchart showing a process of receiving and

processing information by the optical reader.

If the display unit of the mobile communication terminal blinks to transmit information, the light receiving sensor 210 included in the optical reader 200 receives authentication information by sensing the variations in an optical signal and transmits the received authentication information to the control unit 220 of the optical reader at step S610. Then, the control unit determines whether an error is included in the received authentication information at step S620, and determines whether 5 the error is correctable if the error is included at step S640. Further, if the error is correctable, the control unit corrects the error using an error correction method at step S650. In this 10 case, a hamming code, etc. can be used for the error correction method.

15 However, according to circumstances, there may occur a case where errors are so excessive that they cannot be corrected. In this case, the above information reception process is repeatedly executed using the next data stream repeatedly transmitted from the mobile communication terminal. However, if 20 authentication information without error is not acquired in spite of the repeated reception of the information a predetermined number of times, the control unit determines that it is impossible to receive the authentication information at step S660, and indicates an alarm through a Light Emitting Diode (LED) or buzzer included in the optical reader 200 at step S670.

25 The next step is to decrypt encrypted information when no error is included in the received authentication information or after error correction has been completed at step S680. The decryption of encrypted information is performed in such a way 30 that an encryption pattern code is identified from the received

information, and the encrypted information is decrypted on the basis of the pattern code. Further, in order to prevent hacking on the public or private network, the authentication information is additionally encrypted on the basis of a new encryption pattern, and then the additionally encrypted authentication information is transmitted to the payment approval server 400. At this step, information about a payment amount, an affiliate shop code, etc. is added, if necessary, at step S690. In this case, the transmission to the payment approval server can be performed in such a way that the optical reader 200 directly transmits the additionally encrypted information through the public or private network 300, as shown in FIG. 1, or transmits the additionally encrypted information through the personal computer 600, as shown in FIG. 2.

15       Hereinafter, the processing of payment approval by the payment approval server is described with reference to FIG. 11.

20       The payment approval server 400 receives authentication information transmitted through the central control server 500, and decrypts the authentication information on the basis of a predetermined encryption pattern at step S710. Further, the payment approval server determines whether to approve payment requested by the user using the decrypted results at step S720. The determination whether to approve payment is performed by extracting a telephone number and a password from the received 25 authentication information, comparing the extracted information with authentication information, which has been input at the user registering step and stored in the server, and determining whether the extracted information is identical to the stored information. It is apparent that whether to approve payment can be determined with reference to the credit limit or credit status

of the user.

If the determination results are normal, the payment approval server 400 approves the payment by the user at step S730, while if the determination results are abnormal, the  
5 payment approval server 400 allows the user to execute the authentication process again from the beginning, if necessary, by transmitting a disapproval message to the optical reader at step S740.

At this time, when invalid information, such as an invalid  
10 password, is continuously received from the same user a predetermined number of times, the payment approval server 400 takes action to prohibit payment from being further processed with respect to the corresponding terminal if a payment request is not input from the correct user. This action is a means for preventing a request for illegal payment due to the loss of the  
15 terminal, hacking, etc.

In the meantime, if the payment is determined to be approved, the payment approval server 400 notifies the optical reader 200 that the payment has been approved at step S750. The  
20 optical reader 200, having received the approval notification, executes the next operation of, for example, beginning a game, operating a vending machine, or issuing a receipt. In this case, the payment approval server 400 can also notify the approval results to the communication terminal 100 of the user using a  
25 Short Messaging Service (SMS), etc. in addition to the optical reader 200.

Finally, the payment approval server 400 notifies the approval results to the central control server 500, thus allowing the central control server to include a payment amount in  
30 telephone charges, and bill the user at step S760.

In this case, for methods of billing a payment amount, there is a method of allowing the user to deposit or accumulate a certain amount in a prepayment manner and gradually exhaust a payment amount each time from the accumulated fund of the user,

5       in addition to the method of including the payment amount in the telephone charges and billing the user as described above. In this case, the payment approval server 400 can transmit payment details to the central control server 500, but may gradually exhaust each payment amount while managing the accumulated fund

10      of the user without transmitting the payment details.

Although the preferred embodiment of the present invention has been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and

15      spirit of the invention.

#### Industrial Applicability

The present invention is advantageous in that it further expands the range of electronic payment using mobile communication terminals through the reduction of market

20     infrastructure costs for readers, and increases convenience to use the electronic payment in such a way that the present invention removes an increase in cost and inconvenience occurring when a user must purchase a new special mobile communication terminal enabling RF or infrared communication or install an RF

25     chip or infrared module in an existing mobile communication terminal, in addition to inconvenience of transmitting messages or communicating as in the case of the prior art. Further, the present invention provides advantages in that it provides a

primary security function of preventing a third party from paying using the mobile communication terminal due to the loss of the mobile communication terminal by allowing the user to input a password previously registered with the server of a service provider and the mobile communication terminal when a payment program is activated, provides a secondary security function of prohibiting hacking through an encryption system that is automatically updated even though a third party imitates or illegally uses the pattern of the blinking signal of a specific mobile communication terminal, by allocating an encryption method of automatically updating the pattern of the blinking signal at specific periods when information is transmitted using the blinking signal of the display unit of the mobile communication terminal, and provides a tertiary security function of allowing a reader and the server to use additionally encrypted codes therebetween in the case where authentication information passes through a public network, such as wired/wireless Internet, thus guaranteeing the safety and reliability of the electronic payment.

Furthermore, the present invention is advantageous in that it provides compatibility to allow an optical reader to be directly applied to a personal computer and network environment while being based on serial communication, thus executing an authentication process for coupon or ticket services having complicated management systems, and providing, through a single mobile communication terminal, various services, such as a service having a credit or debit card function for the commercial transaction of goods, a service having a cash card function enabling the withdrawal of cash to be performed through an Automatic Teller Machine (ATM), a service having an advance

payment card function including Internet commercial transaction, electronic (e)-money, Internet public phone, etc., and a service having a bonus card function enabling point accumulation and management, bonus mileage management and client management.

Claims

1. An electronic payment system using a blinking signal of a display unit of a mobile communication terminal, comprising:
  - a mobile communication terminal (100) for transmitting authentication information by blinking the display unit using a payment program and displaying a message transmitted from a central control server (500), while performing a typical wireless communication function;
  - one or more optical readers (200) for receiving the authentication information by sensing variations in an optical signal according to the blinking of the display unit of the mobile communication terminal (100), and transmitting the authentication information to a payment approval server (400);
  - a communication network (300) for connecting the optical readers (200), the payment approval server (400) and the central control server (500) to each other;
  - the payment approval server (400) for determining whether to approve payment by a user on the basis of the information transmitted from the optical readers (200), and processing a payment operation in conjunction with the central control server (500); and
  - the central control server (500) for intermediating communication between the payment approval server (400), the mobile communication terminal and the optical readers, storing the payment program therein, and downloading the payment program to the mobile communication terminal when necessary.
2. The electronic payment system according to claim 1, wherein the optical readers (200) are connected to each other

through an internal network (700), the internal network (700) being connected to the communication network (300) that connects the payment approval server (400) to the central control server (500) through a personal computer (600).

5        3. The electronic payment system according to claim 1 or 2, wherein the mobile communication terminal (100) comprises:

      a control unit (110) for controlling the payment program, processing the authentication information, and controlling the blinking of the display unit so as to transmit the authentication 10 information;

      a communication unit (120) for performing a typical communication function;

      a memory unit (130) for storing the payment program and the authentication information therein; and

15        the display unit (140) for blinking in response to a command from the control unit at a time of requiring transmission of the authentication information, while displaying character or image information.

20        4. The electronic payment system according to claim 1 or 2, wherein each of the optical readers (200) comprises:

      a light receiving sensor (210) for sensing the variations in the optical signal according to the blinking of the display unit;

25        a control unit (220) for correcting errors in information transmitted from the light receiving sensor (210), decrypting the information on the basis of a predetermined encryption pattern code, additionally encrypting the decrypted information and transmitting the additionally encrypted information to the

payment approval server (400);

an indication unit (230) for generating an alarm if errors are determined to be irrecoverable as a result of error correction by the control unit; and

5 a communication unit (240) for communicating through at least one of Universal Serial Bus (USB), Recommended Standard (RS)-232, Institute of Electrical and Electronic Engineers (IEEE)-485, and Ethernet.

10 5. The electronic payment system according to claim 1 or 2, wherein the optical readers (200) are connected to predetermined external devices that are activated in response to commands output from the optical readers.

15 6. The electronic payment system according to claim 5, wherein the predetermined external devices are game machines or vending machines.

7. The electronic payment system according to claim 3, wherein the control unit (110) processes the authentication information by combining a telephone number, a password and an encryption pattern code together.

20 8. An electronic payment method using a blinking signal of a display unit of a mobile communication terminal, the method using an electronic payment system including the mobile communication terminal, at least one optical reader, a payment approval server and a central control server, comprising the steps of:

25 a user registering authentication information with the

payment approval server;

activating a payment program to perform electronic payment;

inputting a password to obtain approval for payment;

5 the mobile communication terminal processing authentication information to be transmitted;

the mobile communication terminal transmitting the authentication information by blinking the display unit;

10 the optical reader sensing variations in an optical signal according to the blinking of the display unit, thus receiving the authentication information;

the optical reader checking and correcting errors in the received authentication information;

15 the optical reader decrypting the encrypted authentication information and transmitting the authentication information to the payment approval server;

the payment approval server determining whether to approve the payment on the basis of the received authentication information; and

20 the payment approval server transmitting payment approval results to at least one of the optical reader, the mobile communication terminal and the central control server.

9. The electronic payment method according to claim 8,  
further comprising the step of changing a password after the  
25 registering step.

10. The electronic payment method according to claim 8,  
further comprising the step of changing a payment limit after the  
registering step.

11. The electronic payment method according to claim 8, wherein the user authentication information registering step is performed so that the user inputs one or more of a resident registration number, a telephone number and a password.

5        12. The electronic payment method according to claim 8, wherein the payment program activating step is performed so that an activation command is input through any one of a menu function, a touch screen, a touch pen and a keypad that are provided by the mobile communication terminal.

10        13. The electronic payment method according to claim 8, wherein the authentication information processing step is performed to combine one or more of a telephone number, a password and an encryption pattern code together.

15        14. The electronic payment method according to claim 13, wherein the encryption pattern code refers to at least one of a time of use, the password and the telephone number.

20        15. The electronic payment method according to claim 8, wherein the authentication information decrypting and transmitting step is performed to decrypt the authentication information, additionally encrypt the authentication information on the basis of a new encryption pattern, and transmit the additionally encrypted authentication information.

16. The electronic payment method according to claim 8, wherein the authentication information transmitting step is

performed to shorten a blinking period of the display unit when data indicates "0", and to lengthen the blinking period when data indicates "1".

5        17. The electronic payment method according to claim 8,  
wherein the authentication information transmitting step is  
performed to lengthen a blinking period of the display unit when  
data indicates "0", and to shorten the blinking period when data  
indicates "1".

10      18. The electronic payment method according to claim 8,  
wherein the authentication information transmitting step is  
performed to continuously and repeatedly transmit the same  
authentication information two to five times.

15      19. The electronic payment method according to claim 8,  
wherein the error checking and correcting step is performed using  
a hamming code technique.

20      20. The electronic payment method according to claim 8,  
wherein the error checking and correcting step is performed to  
generate an alarm using an indication unit of the optical reader  
when error correction is not possible even though the error  
checking and correction has been repeatedly performed a  
predetermined number of times.

25      21. The electronic payment method according to claim 8,  
wherein the payment approval determining step is performed to  
check one or more of a telephone number, a password, a credit  
limit and credit status.

22. The electronic payment method according to claim 8,  
wherein the central control server, having received the payment  
approval results, includes a payment amount in telephone charges  
of the mobile communication terminal and billing the payment  
amount.

5

23. The electronic payment method according to claim 8,  
wherein the central control server, having received the payment  
approval results from the payment approval server, exhausts a  
payment amount from a fund accumulated in advance by the user of  
the mobile communication terminal.

10

15

24. The electronic payment method according to claim 8,  
wherein the payment approval determination step comprises the  
step of exhausting a payment amount from a fund accumulated in  
advance by the user of the mobile communication terminal when it  
is determined that the payment is approved.

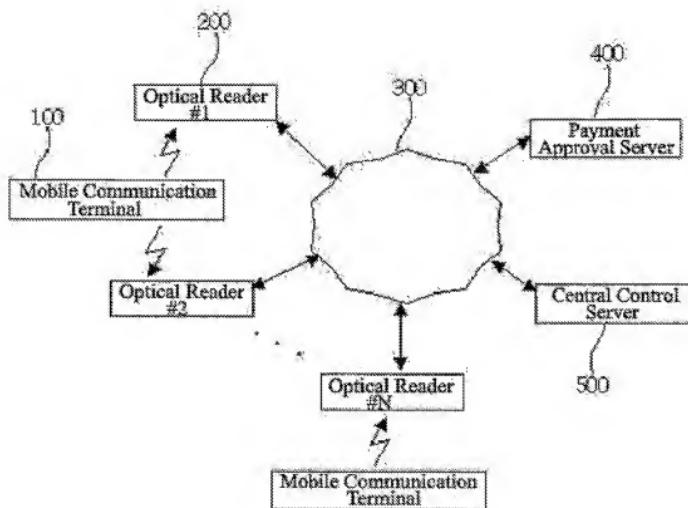


Fig. 1

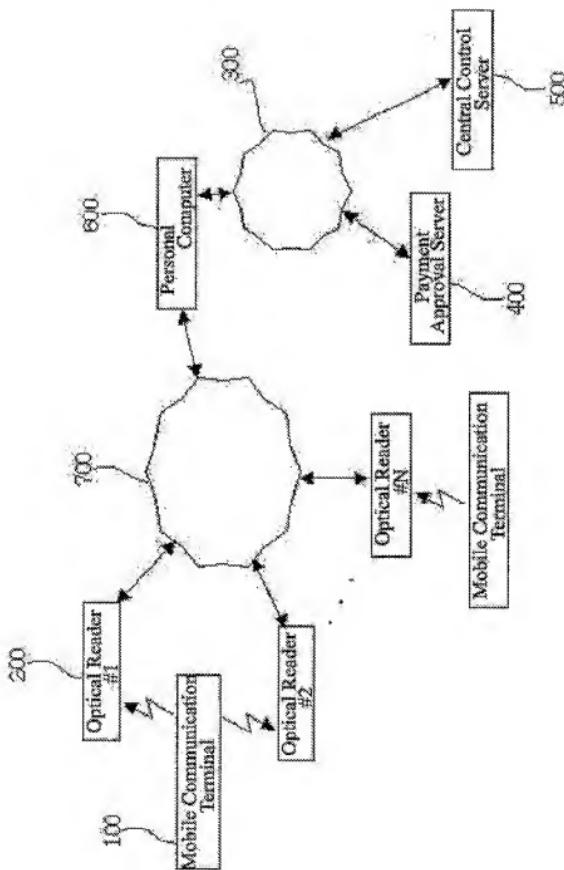


Fig. 2

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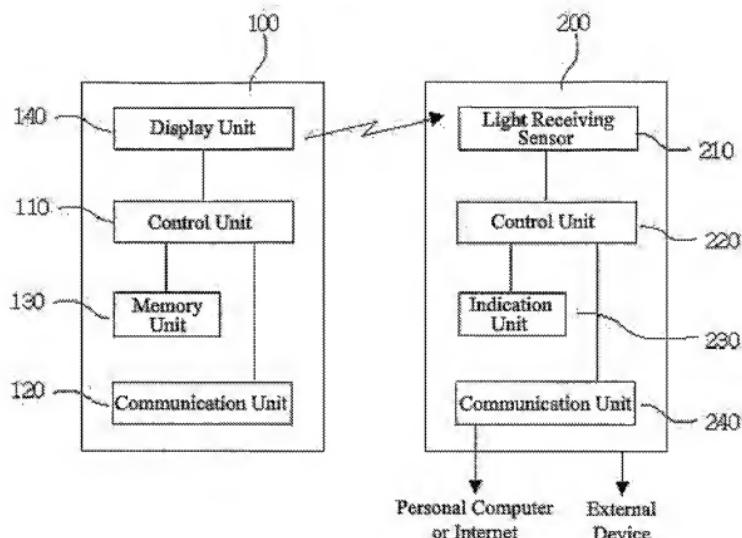


Fig. 3

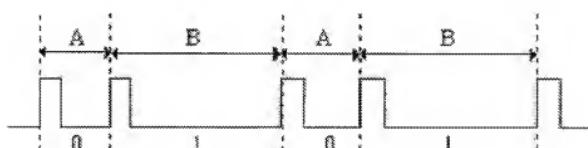


Fig. 4

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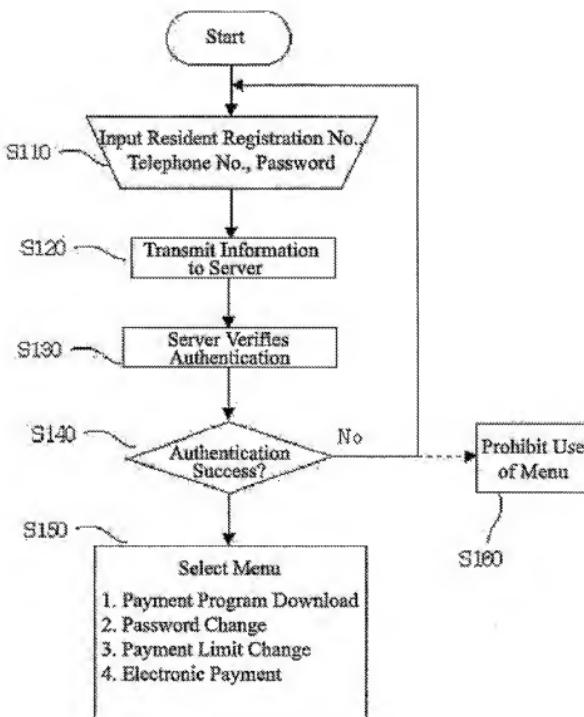


Fig. 5

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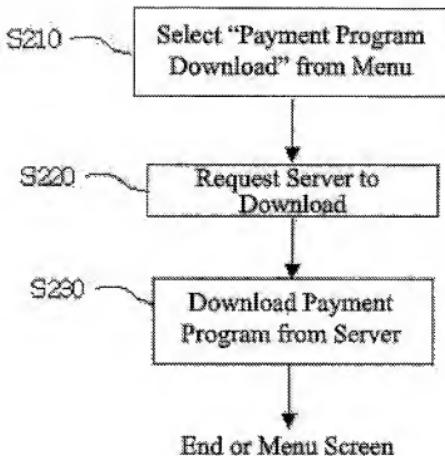


Fig. 6

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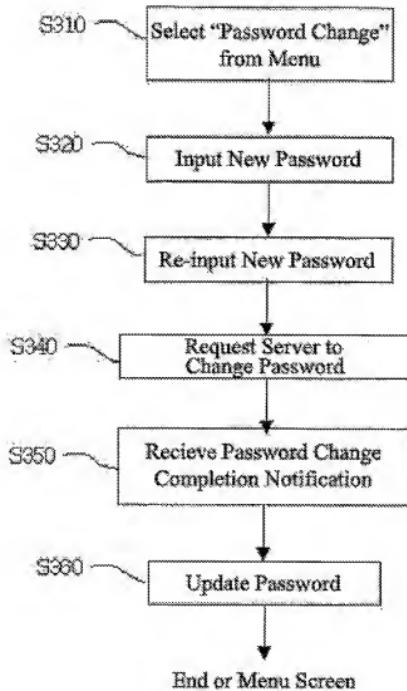


Fig. 7

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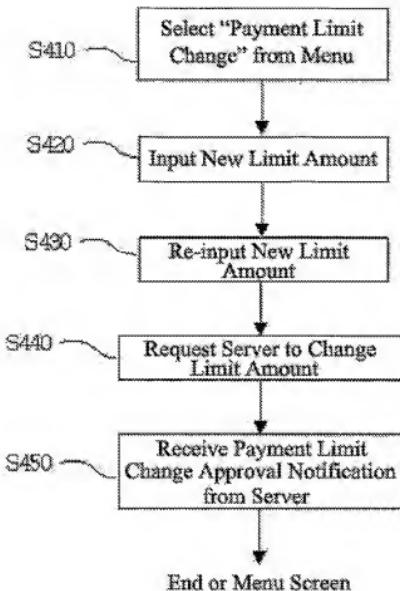


Fig. 8

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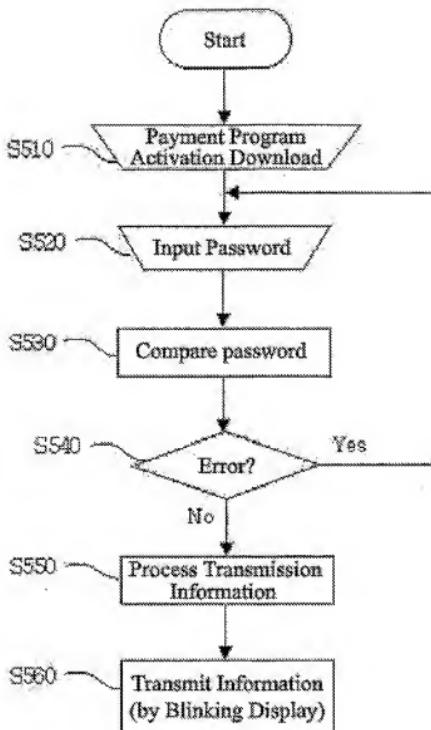


Fig. 9

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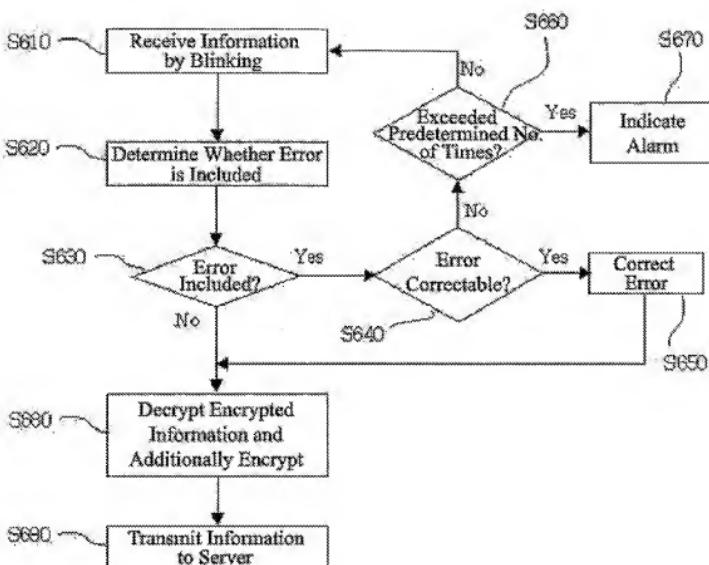


Fig. 10

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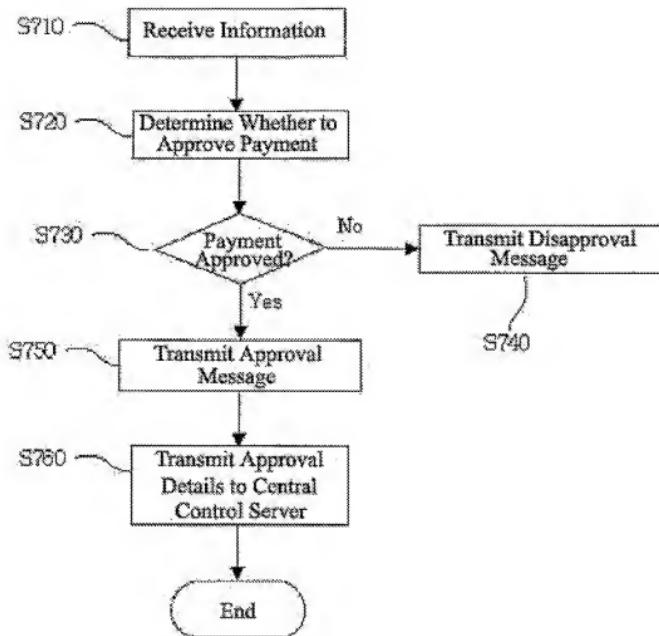


Fig. 11

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/KR2004/001436

**A. CLASSIFICATION OF SUBJECT MATTER****IPC7 H04B 5/00**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC7 G06F 7/08 17/60 19/00, H04B, 12/28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
search terms : electronic billing(transaction), mobile terminal(phone), optical reader, interface

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category <sup>a</sup>	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2002-374570 26 Dec. 2002 (Sony) claims 1-5	1, 8
A	EP 1096344 A1 2 May 2001 (TLC Transport Informatik & Logistik-Consulting GMBH) claim 1	1, 8
A	EP 0960402 A1 1 Dec. 1999 (Vazvan Behruz) see the summary of the invention	1, 8
A	EP 0780802 A2 26 June 1997 (AT&T Corp.) see the summary of the invention	1, 8

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"B" earlier application or patent but published on or after the international filing date

"C" document which may draw doubts on priority claim(s) or which is cited to establish the publication date of claimed or other special reason (as specified)

"D" document referring to an oral disclosure, use, exhibition or other means

"E" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"G" document member of the same patent family

Date of the actual completion of the international search

28 OCTOBER 2004 (28.10.2004)

Date of mailing of the international search report

**28 OCTOBER 2004 (28.10.2004)**

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2004/001436

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2002-374570 A	26 Dec. 2002	None	
EP 1096344 A1	2 May 2001	JP 2001-237638 A	31 Aug. 2001
EP 0960402 A1	1 Dec. 1999	WO 97/045814 A1	4 Dec. 1997
EP 0780802 A2	26 June 1997	None	